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Adsorption of Cd(II) on activated carbon fiber prepared from polyacrylonitrile (PAN)

Abstract

Polyacrylonitrile (PAN)-based activated carbon fiber (PAN-ACF) was prepared with various temperatures of both air treatment (350, 400, 425 and 450 ?) and activation (850 and 900 °C). The observation for the surface nitrogen with X-ray photoelectron spectroscopy (XPS) showed the presence of quaternary-N and pyridinic-N on PAN-ACF. The rise in both the air treatment and the activation temperature increased the nitrogen content in PAN-ACF and also extended the specific surface area. The resultant PAN-ACF prepared at the higher temperature preferably adsorbed Cd(II). The amounts of Cd(II) adsorption were much greater for PAN-ACF than the commercial coal pitch-based ACF containing less amount of nitrogen despite that specific surface area for the coal pitch ACF was twice as great as that for PAN-ACF. The activated carbon fiber possessing greater nitrogen content in the peripheral of the graphite sheet was considered to be effective for the Cd(II) adsorption.